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PROVINCE OF BRITISH COLUMBIA.

DEPARTMENT OF AGRICULTURE
(Horticultural Branch).

Loganberry Culture.

Prospects in British Columbia.

THE loganberry has been grown successfully in some parts of British Columbia for a number of years. The increase in acreage has been only moderate, but just recently, however, there has developed an era of expansion and the loganberry has come very rapidly to the forefront. As it has become better known by the consuming public, its popularity has increased and the demand has become greater. Undoubtedly there will be a large increase in acreage during the next few years. Prospects appear bright; the jam-factories require more stocks; with greater care in picking, packing, and pre-cooling before shipment, the increase in fresh shipping may be very extensive; the juice and evaporating business is yet in its infancy, but in the States to the south these two industries absorb the bulk of the crop.

This circular is the first of a series on small fruits which is being published to meet the incessant demand for literature on this subject.

Origin of the Variety.

The loganberry was discovered in 1881 by Judge J. H. Logan, of Santa Cruz, California, growing in his garden. It has generally been supposed that it was a hybrid of a blackberry and a raspberry. Just recently, however, the United States Department of Agriculture has

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published Farmers' Bulletin No. 998, which is the most recent and complete treatise on the culture of this berry. In this bulletin George M. Darrow, the author, makes the statement that the original loganberry-plant was produced from seed which was collected from a bush of the Aughinbaugh variety of the trailing blackberry of the Pacific Coast, adjacent to which were growing a red raspberry and the Crandall blackberry. He further states that Judge Logan himself considered the seedling to be a hybrid, but that recent investigations have proved that, instead of being a hybrid, this fruit is, in fact, a variety of the Pacific Coast form of the trailing blackberry, and should therefore be termed a blackberry. Consequently in Bulletin No. 998 this berry is called the Logan blackberry and not the more popular and common name of loganberry. However, for the purpose of this circular we will continue to designate this berry by the name loganberry.

Picking the loganberry. Note the waist-carrier holding two hallocks for picking into.

Districts Suitable to its Culture.

Having originated in California, the loganberry soon became known in Oregon and Washington, and from these States found its way into

British Columbia. Owing to climatic conditions, the section of territory west of the Sierra, Cascade, and Coast Ranges and embracing the northern part of California, Oregon, Washington, and the Coast sections of British Columbia is particularly adapted to its cultivation. The plant is quite tender and will not stand zero weather; for this reason it has been very scarcely planted in the Interior valleys of British Columbia, except at Salmon Arm, where its cultivation has proved successful. Owing to its tenderness the plant does not thrive in Eastern Canada or in the Central and Eastern States, and for this reason there seems to be a great future for the berry, because the area where it may be successfully grown is very limited compared to the total area of North America.

Essentials for Success.

Although the section noted above is suitable for commercial loganberry-culture, still local conditions vary as to adaptability, and there are thousands of acres in the loganberry belt which should never be planted to this fruit.

In selecting a suitable location for a plantation, it is obvious that the intending grower must take into consideration the possibility of a profitable market and the availability of adequate transportation facilities. Soils, drainage, temperatures, winds, and irrigation must each be thoroughly taken into consideration.

Soils.—The loganberry will thrive on either a light or heavy, deep, fertile, well-drained soil, but the loams or clay loams are to be preferred. If the lig[illegible] soils are deep and well tilled throughout the growing season it [illegible]ably sure that a good crop may be produced. The loganberry is [illegible]y feeder, and the soil should contain a good supply of plant-f[illegible]d should be very retentive of moisture. A good clay subsoil—not gravel, boulders, or hard-pan—is essential for the best growth.

Drainage.—The loganberry cannot stand "wet feet" during the winter months, and good drainage is essential. If water has a tendency to stand, it is advisable to run a furrow between the rows in the fall. If a soil is otherwise suitable it would pay to have it thoroughly underdrained. Sour, cold, wet soils after underdraining would probably benefit by an application of from 1 to 3 tons of lime per acre. During the high-water period in June or July, water has been known to stand around the plants for a week or ten days without serious effect.

Temperatures.—The loganberry will not stand zero weather or alternate freezing and thawing. It is advisable to keep the new canes on the ground all winter instead of putting them up on the wires. This can be done in the spring after all danger of frost is over. The ground is usually warmer than a cold, raw, winter wind, and the temperature of the cane equalizes with that of the ground.

In the colder sections of the Province where commercial planting is not recommended, but where a few plants may be grown in protected locations for home use, it is advisable to mulch the canes with straw or strawy manure in late fall before winter sets in. Where a covering of snow remains on the ground all winter it will afford considerable protection to the plants.

Young loganberry-patch. Second season's growth. Note intercrop of turnips.

Winds.—Violent winds continually increase the cost of keeping the vines properly trained to the wires. Cold constant winter winds often "winter-kill" a portion of the new canes which bear next year's crop, especially if they have been put up on the wires in the fall. It is advisable to choose a location partially sheltered from such prevailing winds, either by natural or artificial wind-breaks.

Irrigation.—If all other conditions are favourable for the culture of this berry in the dry districts, the one essential to make the culture a success will be irrigation. The governing element in growing the loganberry is a sufficient supply of moisture during the forming and ripening of the fruit. If irrigation is practised it is advisable to apply the water to alternate rows and pick from the unirrigated rows; at the next irrigation apply water to those previously missed and pick from those rows just irrigated. Do not apply water oftener than necessary and follow up with cultivation as soon as the soil is sufficiently dry to till.

Even in the Coast districts irrigation may prove especially valuable, because the summer rainfall is almost *nil*, and just when the fruit is developing it is usually lightest. During the past season two plots in the Saanich District were under observation. Plot No. 1, on a good clay loam and unirrigated, yielded an average of 18 lb. per plant, while Plot No. 2, on a sandy loam, but which received two irrigations from a home-made storage-cistern, yielded 24 lb. per plant. On an acre basis of 680 plants per acre this increase of 6 lb. per plant, due to irrigation, is considerable. Irrigation will prove without doubt a valuable adjunct.

Preparation of the Soil.

All commercial crops demand a good seed-bed, and as much or more so do the loganberry and the other brambles need the best start possible, because they will occupy the same position for ten to fifteen years.

If possible, it is advisable to plant on a piece of land which has carried a hoed crop the year before, so that the soil will be as free from weeds as possible and in a fine state of tilth.

The ground should be manured in the fall and then ploughed and allowed to lie in a rough condition during the winter. In the spring the land should be ploughed again, double-disked, and harrowed before planting. In order that the roots may be forced deeper where moisture will always be more available, it is advisable to spring-plough at least 8 inches, and 10 is prefer The deeper the plough-pan in preparing the plant-bed the more available is the plant-food. Do not prepare the plant-bed when the soil is wet, because an ideal condition is a deeply and finely pulverized top soil.

Propagation.

There are three ways by which the loganberry may be propagated: First, by tip-plants; second, by layering; and third, by root-cuttings.

Tip-plants are secured by burying the tips of the current season's growth in the autumn about the time that growth has stopped. These tips form roots and by spring may be severed from the parent cane and transplanted to the permanent plantation. Nurserymen and growers sometimes transplant these tips to a nursery row and grow

A productive loganberry-plant.

them for another year before setting them out permanently; these are commonly known as transplants. Tip-plants are the most satisfactory, but they cannot be shipped long distances as successfully as the transplants.

Layering may be practised by covering the entire cane in the fall and roots will usually be formed at the nodes.

Root-cuttings are sometimes used, and these are made by cutting the root in pieces 3 or 4 inches long and burying them during the winter in trenches 3 or 4 inches deep. Some of these cuttings will make fairly good plants, but neither of the last two systems are recommended.

Some growers increase their revenue from the plantation by growing tip-plants for the nurserymen, as the production of tips does not interfere with the crop the following year. An acre should produce 3,000 tips.

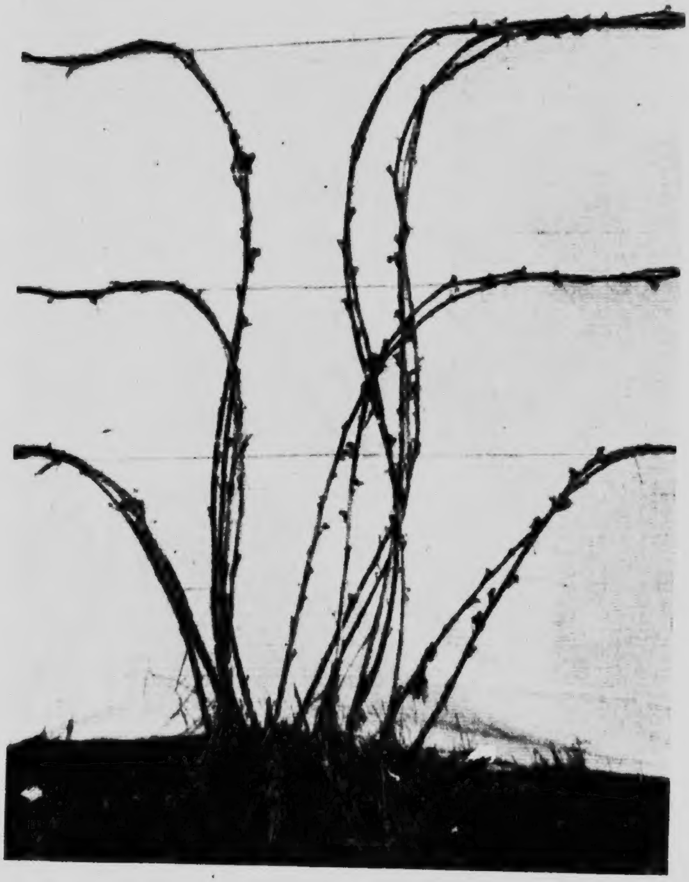
Planting.

Early spring planting before growth starts is preferable in all districts where tip-plants are used. However, fall planting may be adopted in the milder sections where transplants taken from the nursery row are to be used.

Some difference of opinion exists among commercial growers as to which is the most suitable distance at which to set the plants. In any case the distance should not be less than 8 x 8 feet or more than 10 x 10 feet. Variations between these distances are common. In Oregon, where the largest commercial plantations exist, it is the common plan to set the plants 8 x 8 feet. On the lighter and [illegible] soils of Vancouver Island and the Lower Mainland, where the cane-growth will not be excessive, 8 feet apart in the row will prove satisfactory and 8 feet between the rows is usually sufficient, but some growers prefer 9 feet, and some even would not set the rows closer than 10 feet apart, as they state that the greater ease afforded in working the plantation with a team easily compensates for the loss of a few plants per acre.

In bottom or moist land, where the cane-growth will be very strong, it is deemed advisable to set the plants 10 feet apart in the row. For home-gardens in almost all sections the plants may be set 6 feet apart each way. Plants set 8 x 8 feet will require 680 to the acre. To find the number of plants required per acre, multiply the distance between the rows by the distance between the plants in the row and divide the result into 43,560 square feet (the number of square feet in an acre). The quotient will be the number of plants required to set an acre; e.g., 8 x 8=64; 43,560÷64=680.

It is preferable to have the rows running north and south in order to allow an equal distribution of sunlight, but if strong prevailing winds are from the east or west it is advisable to plant parallel with such winds.



Training the vines by the rope system. Note how easily sixteen canes are handled.

Tip-plants are more tender than nursery stock of most other fruits and will not stand exposure to sun or wind; therefore the ground should be thoroughly prepared and the plot marked out ready for the plants on arrival from the nursery. The plants should be set in their permanent location at once.

For a small plot the plants may be set in the ordinary way, but if a large area is being planted and the older plants are being used the following plan will be found convenient:—

When ready to plant make one round of the plough for each row of plants to be set, leaving a furrow 8 inches wide and 8 inches deep. The value of forming a deep plough-pan when spring ploughing proves its value when planting. The transplants should be set so the root ends extend 6 inches lower than the surface of the ground, leaving the crowns 2 to 4 inches below the ground surface. Starting with the outside row as a basis, leave about 15 feet for turning at the end, and set plants apart the distance decided upon. Starting the second row, set plants on the diagonal with plants in the first row. Do not set directly opposite. By the diagonal system the root-feeding surface is the better distributed. When the plot is set by hand, use a cultivator to scuffle the two throws of the original ploughing back into the furrows around the plants. If tip-plants are used they may be set with a spade in the manner ordinarily used for setting strawberry-plants.

Intercropping and Cultivation.

The loganberry requires good tillage; however, during the first year, and possibly the second, intercrops such as potatoes, beans, peas, and similar vegetables which require intensive cultivation, but which are harvested fairly early, allowing the vines to ripen up before winter, may be used as revenue-producers.

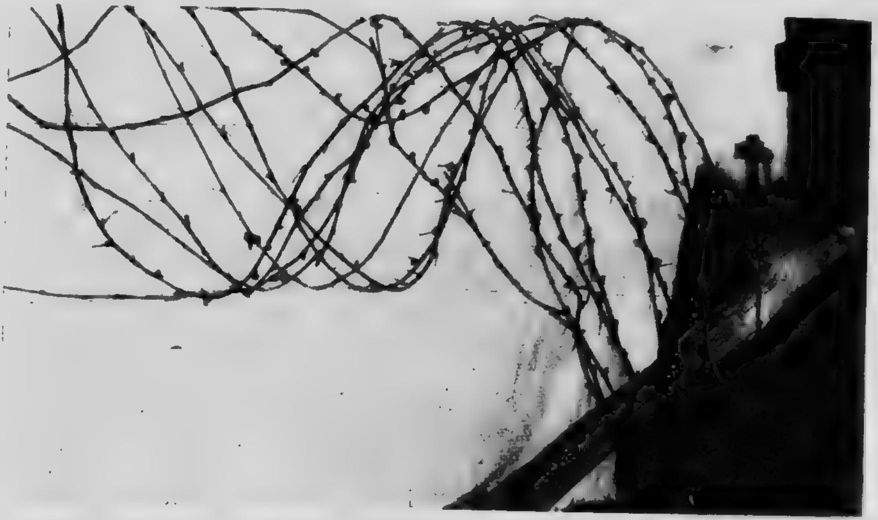
If no intercrops are grown, tillage should be thorough at least once a week, in order to keep down weeds and conserve moisture by means of the dust-mulch. It is possible to cultivate both ways during the early part of the year and thus economize on hand-labour. Later cultivation should be only one way in the direction in which the rows are to run.

All the well-known cultivating implements, such as hand-cultivators, spring-tooth cultivators, harrows, disk harrows, Kimball weeders, etc., are used with success in the loganberry plantation. In some of the large plantations a tool known as the "grape hoe" is used extensively. Its advantage lies in the fact that by a simple adjustment it may be used either to throw the soil to the plant or away from it.

Cultivation should always be shallow near the plant, so as not to disturb the roots.

Training Methods.

Practically all growers are now using a wire trellis for training the vines upon and holding the bearing wood in place. During the winter after the first season's growth 7-foot cedar posts are set 2 feet deep and 30 feet apart in the rows. The end posts should be firmly braced. Upon these posts are tightly strung three strands of No. 12 galvanized wire at levels of 2 feet 6 inches, 3 feet 9 inches, and 5 feet from the ground. Sometimes a two-wire trellis is used. There are two main systems of training adopted which might be described as the weaving system and the rope system. In the weaving system each cane is woven separately to the wires and as large a fruiting surface as possible is exposed. If the rope system is adopted, the canes may be divided into six bundles; e.g., if the plant had sent out twelve canes, the four shortest canes could be wrapped around the lower wire (two each way), the next four longest canes could be wrapped to the second wire, and the four longest canes to the top wire. If more canes are available they could be used accordingly. This system has a tendency to cover some buds, but has been used successfully this year. The weaving system undoubtedly requires more time, but it is claimed that larger crops will be harvested. This, however, has not been proven. In either system the terminal of the cane should be tied to the wire to keep it in place. Some growers adopt a system which might be



Training the vines by the weaving system. Owing to this being the plant near the post, all canes trained one way. Note method of bracing.

called the fan system. Each cane is tied to the wires, and they are spread out like a fan and in most cases headed back considerably.

Another system which might be called the table system is used by some growers. Cross-arms are nailed to the posts and two strands of wire are run parallel to each other. Spreaders of wood 1 inch square are used and the vines are laid upon these. In gardens the vines may be trained to a single pole and tied in three places.

In the spring following the year of planting the young canes are trained to the trellis before growth starts by the system adopted, and should produce a fair crop of fruit of from 500 to 3,000 lb. per acre. The new canes which grow are kept trained along the ground immediately below the bearing canes, and are kept in place by means of a wire hoop similar to a croquet-hoop, or by pairs of stakes 18 inches long, set 6 inches in the ground, and 12 inches apart. These vine-retainers should be set about 4 feet apart. This training of the new vines is essential to prevent them from being injured by the pickers. The tips of the new canes must be covered in the fall if new plants are desired.

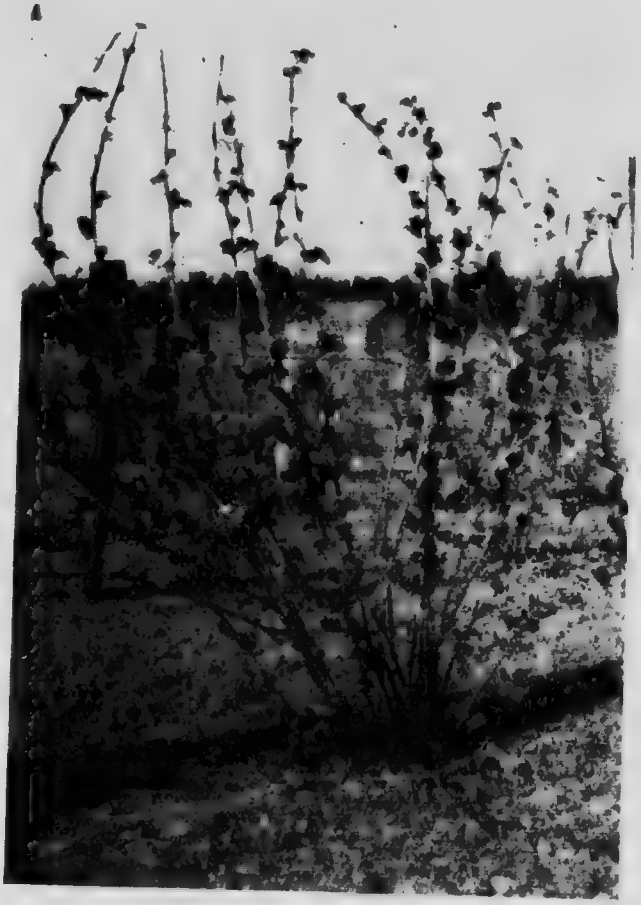
Immediately after the canes have finished fruiting they should be pruned out and burned. This work is easiest done with a pair of long-handled pruning-shears or loppers. The old canes should be cut as close to the crown as possible and long stubs should not be left.

If climatic conditions were suitable the new vines could be trained to the trellis in the fall, as they are handled easiest at that time. However, in British Columbia it is advisable to leave the vines on the ground all winter. By spring they become quite brittle and must be handled carefully. Use a pair of heavy leather gloves, as the small spines are very annoying.

Pruning.

There is very little pruning to be done to the loganberry, except the annual cutting-out of the old wood. The growth of the new canes varies in length, but usually it is not less than 10 feet, and it may be as much as 20 feet or more. It is advisable to cut off a foot or two of the terminal, as it is usually weak in nature and may have been winter-killed back to that extent. Sometimes laterals are sent out, and these may be either removed entirely or headed back to five or six buds. From ten to fourteen healthy strong canes is a good average for a plant to produce each year. The weak canes should be removed, as they produce little fruit and are only a drain on the plant.

If it is wished to produce a large number of tips, the new canes may be pinched back when about 6 feet long, and this will force them to send out laterals, each one of which will produce a tip-plant. This system may cut down the crop yield for the next season, but it will not injure the plant.



Training the vines by the fan system. Note how canes have been headed back.

Fertilizers and Green Manures.

In the first place loganberries should be planted on a deep, fertile well-drained soil containing plenty of humus. Stable manure is undoubtedly the best material which can be used to maintain that fertility, and it also adds large quantities of humus, thus increasing the water-holding capacity of the soil. In the commercial districts, however, stable manure is not always available and it is usually high in price. However, if it can be obtained reasonably there is nothing better.

In reference to commercial fertilizers, they may be of value, as their main constituents—namely, nitrogen, phosphoric acid, and potash—are necessary to the plant, but the grower will do well to make a test in a small way at first, rather than invest any large amount of money without knowing the requirements of his soil. On the other hand, it will pay the grower well to direct his attention to that great source of soil-improvement—cover-crops.

These are of two kinds—leguminous, such as clovers, vetches, peas, and beans, which add humus and also have the power of absorbing nitrogen from the air and storing it up in the soil, and non-leguminous, such as wheat, rye, and rape, which only add vegetable matter.

It is customary to intercrop the new plantation the first year or two, and then it will probably be kept clean cultivated for the next three or four years. By this time, if no stable manure has been added, the soil will probably be in need of some building-up. The soil has been annually robbed without redress; fruit, prunings, and leaves have been taken with nothing returned. This system cannot continue profitably, and cover-crops must be resorted to.

In the fall sow fall wheat and vetch, or such crop as may prove successful in your district, in a strip 6 feet wide between the rows. In the spring delay ploughing as late as possible, when the crop may be turned under. If the growth is very luxuriant it may be necessary to use a chain to turn it under.

Harvesting the Fruit.

The loganberry begins to ripen soon after raspberry-picking has started, and the season lasts from five to seven weeks. On Vancouver Island and in the Lower Fraser Valley ripening starts about the third week in June or the first of July. In picking for the jam or juice factory the plot should be covered at least every fourth day, but every third day is more advisable. For canning and drying purposes the plot should be picked over at least every third day. From three to five pickers per acre will ordinarily be required.

Up to the present time the majority of the fruit has found its way to the jam-factories, but there is an opening for the shipment of the fresh fruit to distant markets.

Picking for the Fresh-fruit Market.

The false impression of many is that the logan is not a fit berry for fresh shipping. This, however, is not entirely true. The logan, through improved methods of handling, stands up as well or better than the raspberry for long shipping. The common causes of early decay are moulds, which grow rapidly under average shipping temperatures. It has beer proven that this mould in starting enters only through bruises of the fruit; that the mould is unable to penetrate the healthy unbroken skin of a well-grown fruit; and that if berries are carefully picked in an even semi-ripe condition, Prairie shipping is not only possible, but practical.

A combination of the fan and rope system, on three wires, which worked satisfactorily.

For successful fresh shipping to distant markets the vines must be picked thoroughly clean each day. If picked only every other day, the pickers should be paid a higher rate per crate and made to keep the overripe fruit (deep red) in one cup and the prime shipping fruit (bright red) in another cup. The grower should not expect the picker to keep the two grades of fruit separate for the same rate. Five to ten cents more per crate is cheap insurance for long shipping, and an effort towards taking advantage of the help lowers the grade of the package. Get the confidence of the pickers; instruct them regarding the necessity of careful handling and compensate them for their efforts.

Number the rows with large figures. Number each picker and record his name and number each day in the time-book. Have picker report to foreman by number when row is finished. Assign and charge the number of the new row to the number of the picker. Inspect each row when finished. If not thoroughly picked, bring the responsible party back to finish the job. Pay enough to demand clean, careful picking.

A note for successful logan shipping: "Pick *clean, carefully,* and *often.*"

Instruct pickers to avoid crushing the berries when detaching them from the vines. Grasp the berry with three fingers instead of two and turn it sideways from the stem. Each picker should be supplied with a waist-carrier which holds two cups. The carrier is suspended from the neck and tied around the waist, thus affording the picker the free use of both hands for picking. In addition to the waist-carrier, each picker is supplied with a hand-carrier which holds six additional cups, making eight cups in all. Three trips with the supplied cups filled make one crate.

On large plantings the help should not be required to walk long distances with the fruit. A helper with a shaded push-cart should convey the fruit from the ends of the rows to the packing-shed.

The picking should be so systematized that sorting-out or extra handling of the fruit in the packing-shed is not necessary.

Tickets with the picker's name and rate per crate are supplied. Upon the card is printed also the group of small figures as follows: 10 figure 3's, 10 figure 2's, 10 figure 1's, 11 figure 4's, and 23 figure 8's, which, when punched by the foreman or packer, equals 288 cups, or 12 crates of berries. Whatever number of cups the picker delivers, that number of cups is punched as credit on his card, which he carries tied to his waist-carrier. Cards are issued each day.

The bonus system is sometimes used with great success. When the berries first start ripening and toward the end of the season, pickers' returns are light and dissatisfaction is apt to prevail. To overcome this, a flat rate per crate is offered throughout the season, and in addition 10 cents per crate extra is allowed each picker who stays until all berries are harvested. After the height of the season's pick many have $20 to $50 to their credit in the bonus. The temptation to quit when picking gets slim is overruled by the vision of this neat bonus to their credit if they stick. Keep the pickers contented; they will break the pack and the profits if you do not. During 1919 in some districts a bonus was not given, but a minimum wage was guaranteed.

Home-made Precooling Plant.

Commercial precooling plants have revolutionized the fresh soft-fruit shipping business in some of the large commercial fruit districts. However, growers in small districts cannot avail themselves of these opportunities.

K. W. Munson, Chilliwack, B.C., has during the past season constructed and operated a home-made precooling plant which he has used for loganberries, raspberries, and blackberries and which has given maximum results.

If cane-fruits are picked while there is any moisture adhering to them, either from rain or heavy dews, practically spells failure in fresh shipping, as the blue mould will develop within twenty-four hours and grows rapidly within the warm express car.

Home-made precooling plant. Placing the berries as they come from the field in the carriers. Note 18-inch electric fan.

To overcome this and to send the fruit on its way without that film of dangerous moisture, the fruit must either be picked after the moisture has evaporated or be artificially dried.

Electric fans have been used in a crude way, but a cooler and dryer using a large electric fan has been used this year by Mr. Munson on fruit-plot in Chilliwack, with 100 per cent. results in shipping t Saskatchewan and Manitoba points on branch lines. It promises t be the beginning of every small-fruit grower's friend.

It is a 2- x 2-foot tunnel 26 feet long, open at both ends, with a lower and upper deck. A high-speed 18-inch electric fan is placed in one end and drives the air over the two layers of fruit through the 26-foot tunnel at a cost of 8 cents per hour.

Draught is cooling and concentrates itself in the tunnel. The air by this method is cooled several degrees, resulting in the fruit being cooled, as well as driving off the surface moisture.

Three cabinet doors open into the tunnel from the packing-bench. When the fruit is brought in, the carrier is immediately placed in the tunnel and left for one hour for blackberries, one to one and a half hours for logans, and two hours for raspberries.

About three times the common number of hand-carriers are needed. On a larger plantation the tunnel could extend the full length of the packing-shed with a fan every 25 to 30 feet.

This method this season (1919) made a difference between 16 and 30 cents per pound for the fruit, and allowed Mr. Munson to ship 92 per cent. of his logan-crop to the Prairies and only 8 per cent. to the jam-factory. On Vancouver Island and the Lower Mainland the jam-factories use a large percentage of the crop at the present time. However, with better iced cars, larger acreages to permit of car-lot shipping, with the development of the markets on the branch lines of the C.N.R. and C.P.R. in Alberta, Saskatchewan, and Manitoba, and with better methods of distribution, a greater percentage of the crop will be shipped fresh and a larger acreage will be planted to meet the resultant demand.

By-products.

Home-made Loganberry Juice.—Citrus fruits contain citric acid in their juice, which acts as a tonic to the human system. Chemical analysis shows that the acid content of the loganberry is chiefly in the form of citric acid, and for this reason the juice is very pleasant and healthful. In the home as a beverage there is nothing more palatable. Because the logan has so many favourable qualities the reputation of its juice has now spread over the entire continent.

The juice is now manufactured commercially in large quantities in Oregon, but at present there are no commercial plants in British Columbia. The machinery is very expensive and the pipes through which the juice passes must be silver-lined to prevent the action of the citric acid.

For home use a practical formula is as follows:—

Use berries which were left to become dead ripe on the vines. When perfectly ripe, the berries contain more sugar than at any other time, and the juice then has the best flavour and aroma. When dead ripe, the berries contain about 78 per cent. juice; when medium ripe, only about 70 per cent.

Press the juice after crushing them thoroughly. If a press is not available, they may be put on a stove with 1 inch of water in the bottom of the pan and heated, *but not boiled*. Then place them in a flour-sack and wring the pulp dry. After this the juice is ready to pasteurize by heating to about 200° Fahr. Caution: Do not let the juice boil. While pasteurizing the juice the glass bottles or jars, tops, rubber rings, corks, etc., should be sterilizing in a pan of nearly boiling water. Sterilize the cup or ladle used for dipping out the juice. Do not touch with the hands any of the equipment to be sealed.

One loganberry-plant in June, trained on three wires according to the rope system.

When the juice is nearly boiling, hold the bottle with a mechanical grip over the pan of juice. Fill to within 1 inch of the top, using sterilized ladle. With a sterilized fork take a rubber ring from the hot water and place it on the jar. With two sterilized forks take a lid from the hot water. Clamp or screw the lid on firmly and the job is finished.

Notice: The vital points throughout the process centre on thorough sterilization. If properly done, even without sugar, the juice will kee for years.

Regarding the amount of sugar, use no sugar at all if you wish. However, sugar must be added sooner or later, so it is advised that enough sugar be added when making to suit the average taste.

Juice made in this manner is too rich to drink straight. When ready to use, dilute with about three parts of water to one of the juice.

Jams, Jellies, etc.—The logan jammed alone is superfine. When jammed with one part of raspberries or blackberries to three parts of loganberries, a more palatable combination could not be desired.

If early apples are available, 20 per cent. apples and 80 per cent. logans make a very good jam or canned combination.

Loganberry jelly is the finest made and has a flavour all its own.

Home-dried logans are a luxury during the winter months.

Before the advent of prohibition loganberry wine was equal to the finest claret.

Yields.

The yield will depend almost entirely upon the nature of the soil and the climatic conditions. The second year the plantation should yield from 500 to 1,000 lb. per acre. The third year and from then on the plantation should be in full bearing, and a good average yield would be from 15 to 20 lb. of fruit per plant, or from 4 to 5 tons per acre. Yields even higher than this have been recorded.

Duration of Plantation.

One thing in favour of the loganberry is the fact that if given intelligent care and plenty of nourishment it is a comparatively long-lived plant. Plantations should easily last from ten to fifteen years, and there are plantations in existence to-day which are twenty years old and bearing as good crops as ever.

Insect Pests and Diseases.

Crown-borer.—A pinkish-white grub with a brownish head which girdles the canes at the crown and bores in the stems of the canes. Its presence is recognized by canes which are partly or wholly dead and discolored patches on the canes, due to girdling and stoppage of the sap. The plant will usually show general unthriftiness.

Remedy: Examine the roots when infestation is noticed and again in the fall, and dig out the borers in the crown. Cut out old canes as early as possible after the crop is gathered, making the cut as close to the crown as possible.

Leaf-hoppers.—These are sucking-insects and do damage by sucking the plant-juices from the leaves and young shoots.

Remedy: Spray while they are in the nymph stage with Black Leaf 40, 5 oz.; whale-oil soap, 3 lb.; water, 36 gallons.

Cane-maggot.—This pest causes a wilting of the young canes when they are from a few inches to a foot or 18 inches high.

Remedy: Cut out and burn immediately and the maggot will usually be destroyed.

Anthracnose.—This disease seems to have caused most trouble to the loganberry. It forms sunken brown or blackish spots on the canes. When these are numerous, and especially if they run together around the canes, the latter either die or are incapable of maturing a crop of fruit. A rotting of the berries which sometimes also results from the disease does not seem to occur to any extent in British Columbia; in fact, the disease itself is not nearly so prevalent as might be expected. Infection takes place in the young canes, but the results are often not observed until the fruit is developed.

Loganberry-patch which has been changed over from the table system of training to the rope system on three wires.

Crown-gall.—This forms irregular knots, excrescences, or tumours on the roots or on the canes at or below the level of the ground. These interfere with the proper nutrition of the plants, which become stunted, the leaves turn yellow, and the crop worthless. When observed on thrifty plants, it is well to make an examination of the root system. Plants found to be affected should be dug up completely and burned and no new planting made in that spot for at least a year.

A form of crown-gall is sometimes found on the cane, the whole area being covered with excrescences. Canes should be cut out and destroyed.

Yellow Rust.—This disease is native to the country, but does not appear to cause much damage. Sometimes it causes a weakening of the fruiting-cane. The orange rust, which is serious in the East and in which the leaves of an affected plant are stunted, curled, and covered with a mass of brilliant orange-red spores, has not been noticed in British Columbia.

Control Measures.—Spraying has not been found very satisfactory as a control measure for loganberry-diseases, and other methods have to be relied upon. Plant only healthy stock. Destroy all wild raspberry and blackberry bushes in the immediate neighbourhood, as these are breeding-grounds for fungi which attack related species. Cut out the old canes as soon after fruiting as possible and burn them. Do not leave them lying about or stacked up near the plantation for any length of time. Keep down weeds in and between the rows. They hold moisture and increase the liability to infections.

Raspberries and blackberries are affected with practically the same insect pests and diseases as the loganberry, and the same control measures should be applied.

Estimated Cost of Planting an Acre.

The cost of planting an acre of loganberries will differ somewhat under different conditions and in different localities, but the following estimate may serve as a guide to intending planters. The figures are based on what a planter might have to pay at 1919 prices.

Ploughing and fitting the land	$ 8 00
Loganberry-plants (8 x 8), 680 at 12 cents	81 60
Planting	8 00
Posts, 180 at 15 cents	27 00
Braces for posts, 32 at 15 cents	4 80
Wire, No. 12 galvanized, 16,000 feet at 8 cents per pound (100 lb.=3,425 feet)	38 00
Cost of setting posts, braces, and stretching wire	35 00
Cultivating and care of plants	10 00
Equipment, machines, sheds, etc.	40 00
Total cost per acre	$252 40

Estimated expense of maintenance per acre after second year at 1919 prices:—

Cultivating	$ 20 00
Hoeing	6 00
Pruning and training	10 00
Spraying if necessary	5 00
Picking 500 crates (average yield) at 50 cents	250 00
Cost of crates, 500 at 33 cents	165 00
Packing, handling, and hauling at 10 cents	50 00
Total expense per acre	$506 00

At 500 crates or 8,000 lb. per acre at this year's price of 16 cents per pound, the gross receipts would be $1,280 per acre. No mention has been made of the probable income from intercrops which might be grown the first or second year.

Summary.

The true classification of the loganberry is not definitely known, but recent research has related it to the trailing blackberry of the Pacific Coast and called it the Logan blackberry.

The Lower Mainland and Island sections have conditions which are ideal for its culture, but with sensible care it may be grown successfully in many parts of the Province.

The life of the loganberry plantation in British Columbia, where given good care, should be from ten to twenty years.

Yield: The second year, from ½ to 2 tons per acre; third year and after, from 3 to 5 tons per acre.

For commercial purposes the berry ships well fresh, is canned, jellied, jammed, dried, and used extensively in the manufacture of juices for beverage purposes. The demand is increasing each year for the logan as a soda-fountain fruit.

Caution should be exercised in choosing suitable location and soils for planting. Soils should be deep, well drained, and well tilled. Buy only tip-plants or transplants for planting.

When planting, a good investment is a perfect seed-bed. Plant in early spring before buds swell.

To propagate plants, throw loose dirt over the tips of young canes at the time growth stops in the fall. Cultivate often and thoroughly throughout the summer.

After the fifth or sixth year, plant a suitable cover-crop in the fall, and plough under about May 1st. This green manure is practical and essential.

Do not plough more than 4 or 5 inches deep after the third year. Deep ploughing disturbs the root-feeders.

Train the canes by one of the systems recommended on three wires. Tie the end of the cane to the nearest wire.

Cut out and burn all bearing canes as soon as harvesting is over.

Pay pickers well. Pay a bonus; insist on careful, clean picking; keep track of the pickers and rows by the number system. Inspect each row when picked. Ship bright-red berries to distant points. Sell deep-red and bruised berries to local market or jam-factory.

Pick clean, carefully, and often if you want to succeed commercially.

Look up in this bulletin the initial cost of planting one acre, also the annual expense after plantation is in full bearing.

Conclusion.

Every home-garden in the city or country of the Province which has conditions to favour its culture should have at least four plants of this excellent berry. Each plant should supply an average of 15 lb., or one crate.

Produce them yourself. They are finer in quality when picked dead ripe from the bush.

Use the logan fresh and preserved in the home. It is a tonic as well as a food.

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This circular has been prepared by K. W. Munson, former District Field Inspector, and E. W. White, District Horticulturist, at the request of the Horticultural Branch.

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